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# Variations in breastfeeding practices in the NICU: A mixed methods investigation

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Variations in Breastfeeding Practices in the NICU: A Mixed Methods Investigation

Elizabeth Emaleo Nottingham

A dissertation submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

Doctor of Philosophy

Communication Sciences and Disorders

May 2018

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## **Dedication Page**

This dissertation is dedicated to my family, without whom, this project would not have been possible. To Brynn and Henry, thank you for teaching me important things, and helping me to be “the best mom ever”. To Brian, your spontaneity helped make it possible to start this project, and your never ending support made sure I finished it!

### **Acknowledgements**

I would like to acknowledge the people who provided academic, creative, and scientific support for this project along the way: Lisa Akers, Erin Clinard, Sharon Stout, and Marguerite (Meg) Fertig. Most importantly, I would like to acknowledge my mentor and friend, Cynthia O'Donoghue, whose knowledge, support and editing skills never cease to amaze me!

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## **Abstract**

Human milk is crucial for the healthy development of infants, particularly preterm infants. Practice patterns and resource allocations to support and promote optimal breastfeeding in this population of infants varies by facility. The purpose of this mixed methods study was to explore differences in practice patterns, describe nurses' knowledge and perceptions about breastfeeding in the NICU, and identify factors contributing to the differences between hospitals.

Researchers used a sequential explanatory design to gather both quantitative and qualitative data. In the first quantitative phase, a Web-based questionnaire was developed and deployed via Qualtrics to all hospitals with a Neonatal-Perinatal Fellowship Training Program in the United States (N=98). Results from the survey informed phase II. Qualitative semi-structured one-on-one phone interviews were conducted with a sub-set of respondents from institutions that completed the questionnaire. Purposive sampling ensured representation from institutions employing a variety of practices. Interviews were recorded, transcribed, and coded using initial focused coding and constant comparative analysis to identify themes, following a grounded theory framework.

Differences in breastfeeding support are apparent in hospitals across the United States. Nurses in hospitals utilizing more breastfeeding support measures emphasized feeding directly at the breast in the NICU, use of interdisciplinary team decision making, and hospital support of breastfeeding (i.e., resources). Nurses in hospitals employing a moderate number of breastfeeding support measures reported emphasis on performance improvement measures, breastfeeding in the NICU, and support for mothers. Nurses from the hospitals reporting the least number of breastfeeding support measures more



frequently reported nurse discomfort with breastfeeding, lack of team decision making for feeding, and staff lack of knowledge about breastfeeding.

Policy changes and implementation of best practice protocols require a deep understanding of the range of breastfeeding experiences that occur in NICUs across the United States. This study illuminates variations in practice patterns of level III and IV NICUs, and identifies different themes highlighted by nurses working in those hospitals. Hospitals may use this as a guide for implementation of improvement projects in a movement toward more evidence based practices.

## Background

There are numerous governing bodies that recognize and promote the importance of breastfeeding (American Congress of Obstetricians and Gynecologists, 2016; Centers for Disease Control and Prevention: Division on Nutrition Physical Activity and Obesity, 2016; Eidelman & Schanler, 2012). The World Health Organization (WHO) recommends breastfeeding a child for at least two years or longer (World Health Organization, 2009). In addition, the American Academy of Pediatrics (AAP) recommends breastfeeding to continue past the first year of life, as it continues to be desirable by both mother and child (Eidelman & Schanler, 2012).

The impact of breastfeeding on health and developmental outcomes may be even greater for premature infants. There are numerous benefits afforded to these infants who receive human milk, including reduced incidence of Necrotizing Enterocolitis (NEC) and sepsis, as well as improved cognitive, motor, and behavioral achievements (Eidelman & Schanler, 2012). Given both the health and economic advantages that breastfeeding affords infants born prematurely, the AAP advocates for the provision of human milk to premature infants, and stresses that “The potent benefits of human milk are such that **all preterm infants should receive human milk**” [emphasis added] (Eidelman & Schanler, 2012, p. e831). Ironically, while breastfeeding is arguably more important for preterm infants than for those born at term, the rates of breastfeeding initiation and duration in this population are often lower than what is reported in their term counterparts (Callen & Pinelli, 2005; Smith, Durkin, Hinton, Bellinger, & Kuhn, 2003; Yip, Lee, & Sheehy, 1996).

Despite these strong recommendations from respected governing bodies, as well as the published scientific evidence regarding best-practice patterns, differences in feeding practices and breastfeeding support between hospitals persist (Dodrill, McMahon, Donovan, & Cleghorn, 2008; Lee et al., 2000; Siddell & Froman, 1994). The most recent comprehensive study of breastfeeding practices in United States NICUs is more than 20 years old, and significant changes in breastfeeding patterns and supports have occurred since that time (Siddell & Froman, 1994). Most notably, changes to the Baby-Friendly Hospital Initiative (BFHI) in 2009 and expert recommendations for the expansion of BFHI practices into the NICU in 2013 have altered the landscape of breastfeeding support and recommendations (Nyqvist et al., 2013; World Health Organization, 2009). With the increased emphasis on breastfeeding support and promotion, and modifications in national and global trends, an updated survey to inform professionals and policy makers how NICU practices in the United States have mirrored these changes is merited. Additionally, rigorous investigation of the mechanisms influencing the persistence of these inequalities has not been conducted.

Thus, there are two main problems identified. While it is empirically documented that breastfeeding promotes healthy development and human milk is ideal for infants, particularly neonates, it is hypothesized that contemporary NICU practices do not reflect current evidence-based guidelines. Although variation between hospitals has been documented, the last published study from the United States was conducted more than 20 years ago, warranting an update to the available data. Second, possible explanations for differences in the implementation of current evidence-based guidelines have not been well documented or described. This investigation addressed the following questions:

1. What are current NICU policies and procedures related to various oral feeding and breastfeeding support practices?
2. What are NICU nurses' perceptions and knowledge about breastfeeding?
3. In what way do perceptions and knowledge of NICU nurses help to explain differences in practices?

## **Methods**

### *Design*

This study used a mixed methods, explanatory sequential design (Creswell & Plano Clark, 2011). Phase I was quantitative and Phase II was qualitative. Table 1 depicts the timeline and phases of the project (Ivankova, Creswell, & Stick, 2006). The quantitative phase was designed to investigate differences in practice patterns related to breastfeeding in the NICU, inform development of interview questions, and identify potential candidates for semi-structured interviews. The qualitative phase was more heavily weighted, as it was deemed more important to understand the mechanisms influencing the persistence of the variations identified in phase I. For these reasons, a mixed methods design was the optimal approach to address the research questions posed. Both phases of the study were approved by the Institutional Review Board at James Madison University.

Table 1

*Sequential Explanatory Study Design*

<b>Phase</b>	<b>Procedure</b>	<b>Product</b>
Quantitative Data Collection (09/01/15 – 09/20/15)	<ul style="list-style-type: none"> <li>• Web-based questionnaire deployed to NICU medical directors in 98 US hospitals, one lost to attrition (N=97)</li> </ul>	<ul style="list-style-type: none"> <li>• Demographic and numeric data for 31 respondents (32% response rate)</li> </ul>
Quantitative Data Analysis (10/15 – 08/16)	<ul style="list-style-type: none"> <li>• Data screening</li> <li>• Frequency counts</li> </ul>	<ul style="list-style-type: none"> <li>• Descriptive statistics</li> <li>• List of respondents that provided the name of their institution (n=17)</li> <li>• Categorization of hospitals into three “tiers” based on responses to select questions</li> </ul>
Connecting Quantitative and Qualitative Phases (08/16 – 06/17)	<ul style="list-style-type: none"> <li>• Purposive sampling- participants from hospitals in each tier were recruited to allow for maximum variation</li> <li>• Developing interview questions</li> </ul>	<ul style="list-style-type: none"> <li>• Cases (n=10)</li> <li>• Interview protocol</li> </ul>
Qualitative Data Collection (07/17 – 11/17)	<ul style="list-style-type: none"> <li>• Individual, semi-structured phone interviews with 10 participants</li> <li>• Recording and transcription of interviews</li> <li>• E-mail follow up (member checking)</li> </ul>	<ul style="list-style-type: none"> <li>• Text data (interview transcripts, memos)</li> </ul>
Qualitative Data Analysis (07/17 – 02/18)	<ul style="list-style-type: none"> <li>• Coding and thematic analysis</li> <li>• Within group, and across group theme development</li> </ul>	<ul style="list-style-type: none"> <li>• Codes and themes</li> <li>• Similar and different themes and categories</li> <li>• Visual models and representation of coded data</li> </ul>

Table 1

<i>Sequential Explanatory Study Design</i>		
Integration of Quantitative and Qualitative Results (03/18)	<ul style="list-style-type: none"> <li>• Interpretation and explanation of the quant and qual results</li> </ul>	<ul style="list-style-type: none"> <li>• Discussion</li> <li>• Implications</li> <li>• Future Research</li> </ul>

### *Phase I- Quantitative Web-Based Survey*

Several key factors have been identified in the empirical literature that can support or hinder breastfeeding in the NICU (Dodrill et al., 2008; Nyqvist, 2005). In addition, there are many factors encouraged by experts who published the Baby Friendly Hospital Initiative expansion to the NICU (Nyqvist et al., 2013). These factors provided the framework for developing the survey questions.

The survey began with a consent form, followed by general questions related to characteristics of the NICU (how many beds, etc.), and then transitioned into specific questions regarding oral feeding practices and breastfeeding support. The survey ended with demographic questions related to the characteristics of the person responding to the survey (credentials, role, length of time employed in the NICU, education level).

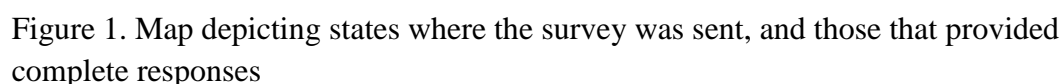
Use of question branching and logic streamlined the questions that each respondent was administered, maximizing efficiency. To avoid responder fatigue, the questionnaire required only 10-15 minutes to complete, and respondents could pause and resume the survey as needed. The online platform *Qualtrics* was used to collect and store all questionnaire responses, which were recorded confidentially. Access to the Qualtrics website was secured with password protected login information available only to

researchers (i.e., a secure server). Prior to the formal launch of the survey, it was piloted with medical and therapeutic professionals familiar with NICU practices to assess question clarity and provide feedback on content, design, and length. The survey instrument is available in Appendix A.

A database was created using an internet search for hospitals employing medical school post-graduates in neonatal-perinatal fellowship training programs. Obtaining data from a relatively homogeneous population of NICU infants was crucial, to help control for the confounds of gestational age and medical complications, that may influence breastfeeding support and oral feeding decisions. All hospitals included in the database have NICUs rated level III or IV, and all hospitals care for the youngest and sickest of infants. By including the entire population of hospitals employing fellowship training programs, researchers controlled for any possible biases or confounds associated with convenience sampling. A total of 98 hospitals were included in the database.

An introductory email was sent to the medical directors of 98 NICUs. This allowed researchers to ascertain valid e-mails and to introduce the purpose of the study. Returned or inaccurate emails were investigated and replaced with those of the current medical director or division chief. This cleansing of the contact list allowed researchers to reach all 98 institutions in the population. The second hand distribution of emails was not prohibited; the medical director could elect to forward the link to another staff member deemed qualified to complete the survey. One participant was lost to attrition; therefore representatives from 97 hospitals had the opportunity to complete the questionnaire.

The questionnaire was disseminated to all medical directors included in the database. Notification of the opening of the survey was sent via e-mail through the



Data from Phase I were analyzed using descriptive statistics. Data answering the first research question included averages and percentages related to the number of hospitals employing specific practices, and terms to describe current oral feeding practices, such as “infant-led feeding.” Analysis of responses revealed that some practices were more universally adopted (e.g. use of kangaroo mother care), while others



were inconsistent. Factors that could most optimally divide hospitals into different groups based on the number of breastfeeding support practices reported were analyzed.

Specifically, the items with greater variability included: 1) having a formal process/protocol related to oral feeding initiation 2) providing oral feedings based on infant cues rather than a strict schedule 3) preventing the use of formula 4) preventing the use of strict gestational age guidelines for the initiation of nutritive oral stimulation and 5) ensuring that the first oral feeding occurs at the breast, rather than with an artificial nipple.

Responses to questions asking about the five factors described above revealed inconsistent use of those strategies in the hospitals surveyed. Responses were analyzed, and hospitals were awarded a “point” for each optimal response. Optimal responses were those that have been identified in the literature to promote improved breastfeeding initiation or duration for infants in the NICU (e.g., having a written policy). Hospitals were divided into groups, based on the number of breastfeeding support practices they reported. Those with the most “points” were assigned to Tier 1, hospitals with a moderate number of points were assigned to Tier 2, and hospitals with the least number of points were assigned to Tier 3.

Findings in the quantitative data helped to inform Phase II relative to question development, division of hospitals into tiers, and participant selection. To protect respondents’ confidentiality when completing the online survey, their answers were anonymous. However, there was one optional item on the questionnaire that allowed responders to provide the name of their institution of employment. Insuring that participants in the qualitative phase were from the same institutions that completed the

questionnaire was vitally important to further understand the practice patterns unique to each institution. While this selection process may introduce a selection bias (those responders that provided the name of their institution may have done so to highlight their best-practice protocols), the importance of confidentiality to increase honesty of responses outweighed any possible selection bias. The number of participant responses in each phase of the study is depicted in Figure 2.

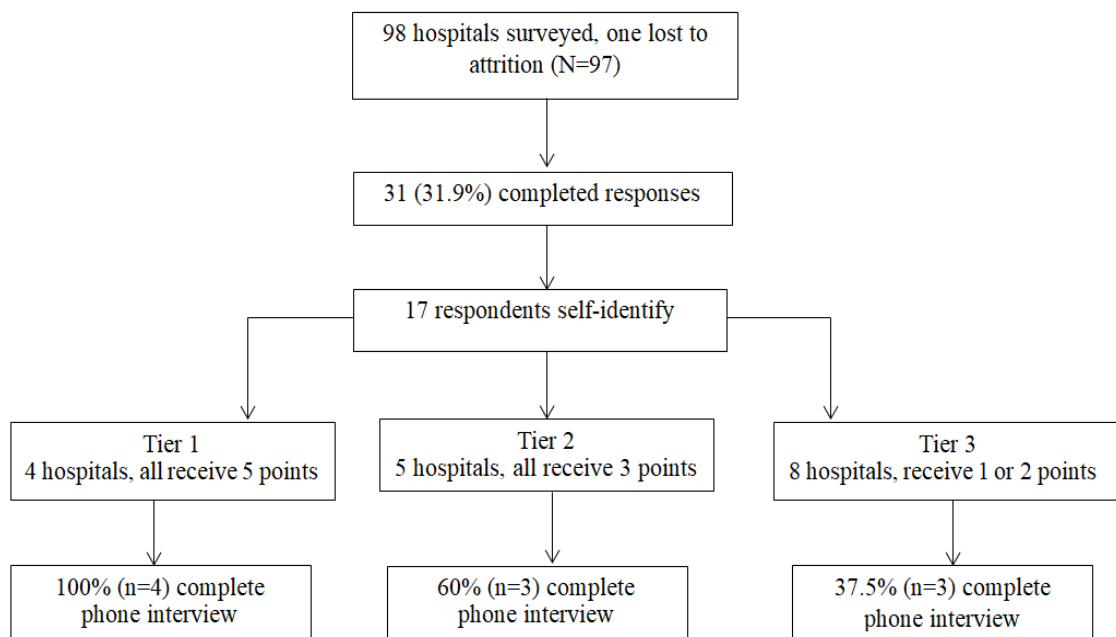


Figure 2: Flow of participants in phases I and II

To determine who (e.g., medical director, nurse, lactation consultants, other allied health professionals) should participate in the semi-structured interviews, responses from the questionnaire were analyzed. There was an item that asked “Which professionals routinely perform assessment for oral feeding readiness?” Survey responses revealed that 30 out of 31 respondents indicated that nurses are involved in this decision-making process. Additionally, nurses are employed in every NICU (whereas some NICUs may

not employ International Board Certified Lactation Consultants- IBCLC, or allied health professionals). For these reasons, it was important that the voices and opinions of nurses in the NICU be heard. There were no specific criteria for the nurse's role in the NICU; they could be a bedside nurse, nurse lactation professional or a nurse manager.

Two registered nurses with NICU experience (who also held IBCLC certification) completed interviews to pilot question clarity. These nurses were not employed by any of the hospitals involved in the study. Medical directors from the 17 hospitals that self-identified on the questionnaire were sent another e-mail inviting them to participate in Phase II. They were asked to identify a nurse working in the NICU, who would be qualified and interested to complete a phone interview. Nurses were contacted directly to set up a time to complete the phone interview. The day of the interview, the nurse respondent received a reminder e-mail and electronic consent form. Each participant provided verbal consent over the phone prior to the interview. Questions are available in Appendix B.

Interviews were conducted from July, 2017 to November, 2017 with the time to complete the interviews approximating 26 minutes (range 17 to 33 minutes). Rev© voice recording software was used to record and transcribe the interviews. Transcripts were then compared with the audio recording for accuracy, and edits were made. To protect the anonymity of the interviewees and their hospitals, information regarding the locations of the institutions in which they work is not reported. Many of the interviewees represented institutions in the northeast or mid-Atlantic states. Fewer responses from the south, mid-west or west coast were received. Participant characteristics are outlined in Table 2.

Table 2

*Demographic Characteristics of Participants (N=10)*

	<b>Pseudonym</b>	<b>Tier</b>	<b>Setting*</b>	<b>NICU Level</b>	<b>Number of beds</b>	<b>Average Capacity</b>	<b>Education Level</b>	<b>Lactation Training</b>	<b>Years Exp.</b>	<b>IBCLCs dedicated to NICU</b>
1	Alice	1	Urban	IV	98	Full	BSN	CBC <sup>a</sup>	8.5	2
2	Betty	1	Urban	IV	59	Full	MSN	None	37	4
3	Cathy	1	Urban	III	84	Full	BSN	None	6.5	2
4	Denise	1	Urban	IV	51	40-45	Diploma	None	20	0
5	Abigail	2	Urban	IV	97	Full	BSN	IBCLC <sup>b</sup>	32	0
6	Brittany	2	Urban	IV	40	32	MSN	CEUs <sup>c</sup>	14	0
7	Christine	2	Urban	IV	52	48	MSN	None	25	3
8	Audrey	3	Urban	III	50	46	BSN	CLC <sup>d</sup>	40	0
9	Brenda	3	Urban	IV	46	Mid 30s	AA	Evergreen	20	0
10	Caroline	3	Urban	III	77	Full	BSN	CLC <sup>d</sup>	34	0

\*Setting was verified using US Census Bureau Information collected from

<https://storymaps.geo.census.gov/arcgis/apps/MapSeries/index.html?appid=9e459da9327b4c7e9a1248cb65ad942a&cid=16O104>

a Certified Breastfeeding Counselor

b International Board Certified Lactation Consultant

c Continuing Education Units (related to human lactation)

d Certified Lactation Counselor

Interviews were analyzed following a grounded theory tradition. Initial coding was completed by reviewing the transcripts line by line, and assigning meaning to the participants' words. As frequently done in the grounded theory tradition, transcripts were analyzed as additional interviews were conducted. This allowed for constant comparative analysis, and allowed researchers to remain engaged with and close to the data throughout the qualitative phase (Charmaz, 2006). Initial coding was completed by the first author. Construction of a codebook ensured that as new transcripts were coded, already created codes would be used. A copy of the code book including all codes and definitions is available in Appendix C. As new codes emerged, they were added to the codebook. Saturation was reached after eight interviews, evidenced by no additional codes emerging from the data. To ensure saturation, an additional two interviews were conducted, with no new codes emerging.

Once the first author coded all ten transcripts, consensus coding with a second researcher was conducted. Both researchers simultaneously reviewed 30% of transcripts in their entirety, and agreed on codes. The codebook was updated, and the remaining seven transcripts were reviewed and re-coded as appropriate by the first author to ensure reliability of the codes used. After initial coding was conducted by hand, all transcripts and codes were entered into NVivo qualitative data analysis software, version 11 (QSR international, Pty Ltd, Melbourne, Australia). This software was utilized to obtain frequency counts, identify trends in the data, and store quotations exemplifying themes. Finally, related codes were clustered to develop themes. This process was completed by a team of two researchers who reviewed all codes and created themes first individually, and then together, until consensus was reached. Where there was discrepancy, participant

quotations were reviewed and consensus was reached on the most appropriate theme for each code.

To enhance the rigor of the qualitative research, several accepted methods were used (Tong, Sainsbury, & Craig, 2007). Given the nature of qualitative research, it is important for researchers to “bracket” through writing about their own experiences, and to attempt to identify their own prejudices and assumptions. In addition, when readers can gain an understanding of the researcher’s background, they can formulate their own opinions about how the researcher’s own knowledge and perceptions may influence their work (Tong et al., 2007). The first author conducted all interviews and data analysis for this study, and a brief synopsis of her background is available in Appendix D.

In addition to bracketing, other techniques were used to enhance the rigor of this study. Member checking, or providing interviewees the opportunity to read their transcripts and provide clarification was used. Each participant was emailed a copy of her transcript for review. One participant noted minor editorial changes, and no content changes were requested by any of the participants. Finally, use of a coding team was utilized to increase validity of codes and themes. Three of the ten transcripts (30%) were coded in their entirety by a team of two coders, exceeding suggested acceptable values for inter-coder reliability (Campbell, Quincy, Osserman, & Pedersen, 2013). One transcript representing each of the three tiers was used. Researchers used consensus coding, where both investigators agreed on codes assigned to the text, while reviewing transcripts together. Finally, themes were developed by a team of two investigators, ensuring agreement on all themes that emerged from the data. This team also assigned a positive/negative rating for each code, to describe whether it would be something to

support (positive) or hinder (negative) breastfeeding in the NICU. The first author was involved in all code and theme development.

## **Results**

### *Phase I*

Thirty-one participants completed the questionnaire in its entirety, resulting in a completion rate of 31.9%, from programs in 23 of the 39 states that had a NICU fellowship training program, providing good geographic distribution. Surveys were completed by a variety of NICU personnel, including medical directors (n=16), nurses (n=4), other physicians (n=6), and therapists (n=5). Respondents with at least 10 years of experience in the NICU reached 90%. Wide variation in practices utilized to support and promote breastfeeding in the NICU was reported. A summary of breastfeeding supports and interventions is presented in Table 3.

### *Phase II*

As previously mentioned, more importance was delegated to describing nurses' knowledge and perceptions about breastfeeding, and exploring how that knowledge and perception may relate to differences in practice patterns. Therefore, more weight was given to the qualitative analysis. To highlight differences in knowledge and perceptions of the nurses in each tier, counts for the most frequently used codes in each tier are reported. For readers' reference, the most frequently used codes and a description and quotation for each are provided in Table

Table 3

*Current Breastfeeding Practices for Mothers Who Wish to Breastfeed (N=31)*

Categories and specific practices	n (%)
<b>Breastfeeding Support</b>	
Routinely educate mothers on the benefits of breastfeeding	30 (97%)
Routinely use kangaroo mother care	30 (97%)
Direct breastfeeding is the first oral feeding method	19 (61%)
Formal process, protocol or clinical pathway for initiating oral feeding	25 (80%)
<b>Breastfeeding Interventions</b>	
Breast shields	18 (58%)
Consultation with lactation consultants	30 (97%)
Consultation with SLP/OT/PT	14 (45%)
Frequent exposure/latching onto breast	26 (84%)
Use of supplemental nursing system	5 (16%)
Limiting/preventing use of pacifiers (dummies)	6 (19%)
Rooming-in (mother can stay with infant in a private room)	11 (35%)
Preventing use of formula	16 (52%)



Table 4

*Most Frequently Assigned Codes, Definitions, and Sample Quotations*

<b>Code</b>	<b>Definition</b>	<b>Quotation</b>
Team Decision	Multiple players are responsible for making decisions related to infant feeding, sometimes including the parents. This suggests a true interdisciplinary model of care.	“Well, it's all team based. We have to get the different players talking about the baby. Hopefully with the parents right there during morning rounds. Every baby in our unit has a standing order for occupational therapy to be involved from day one from admission.”
Breastfeeding	Directly feeding at the breast. Different from providing mothers' own milk, or donor milk with an artificial nipple or feeding tube.	“I would say, if the mom is there, and she has the desire to breastfeed, we would prefer to have the baby try at the breast before anything else.”
Numbers	Being concerned with objective measures of an infant's feeding, including following a schedule, weight gained and volume taken.	“We basically do an every three hour feeding schedule and we have a specific volume that they need to get with each feed.”
Hospital Support	The general status of breastfeeding throughout the hospital, not just in the NICU. This could mean displaying signs supporting breastfeeding, among other things.	“It starts at the top and it's not just a grass roots effort to try to help moms breastfeed. It comes down from above and it helps quality improvement systems be in effect that help nurses not be just the driving force. It's lactation specialists. It's nurse practitioners, providers. Everybody is helping that goal happen. It's not just driven by nurses.”
Performance Improvement	Working toward using more evidence-based practice, improvement in practices	“I think, and we are focusing on that this fall is increasing our skin to skin because that is, I just feel that, that's the start of it, and so I feel like babies, a lot of times naturally would go to the breast and make it happen sooner because they're so interested, so I think that's one thing that we could do a little better with, and we realize that, and it's on our, it's our radar as far as projects.

Support	Nurses supporting mothers, could be related to initiating skin-to-skin, expressing milk, or breastfeeding.	“...so the nurses tend to keep an eye on a mom's milk supply and try and give her support as if they see that she's either discouraged or having challenges maintaining her supply or even initiating her supply.”
Nurse Discomfort	Describes a nurse's level of skill, proficiency, and self-confidence in performing job duties, such as handling a baby on a ventilator, or putting a baby to breast.	“Some of that is dependent on the nurse's level of comfort. I'm noticing that a lot more younger nurses or newer nurses are a little more afraid to take a baby out of bed that's on a ventilator as opposed to someone that's a little more seasoned and more afraid, maybe a line's going to come out, the tube's going to slip, but I think with experience, they get more comfortable handling a baby that's on mom's chest.”
No Team Decision	One person is responsible for making decisions related to infant feeding. They may receive input from other professionals. This suggests more of a multi-disciplinary model.	“It's very much nursing decisions that make that decision okay are they going to bottle feed or breastfeed and then how much is going to go through their tube.”
Lack of Knowledge	Staff and employees lack knowledge about breastfeeding.	“The other issue, I think, is just a lack of knowledge base on their part where they don't really understand that the practice is the key. That taking that time with the mom and the baby of getting a sense of how to establish good breastfeeding practices, how important that is. They just don't. They haven't experienced it or they lack the education behind it for a number of reasons.”

## **Tier 1**

The four most frequently used codes for respondents in Tier 1 included team decision making, breastfeeding, numbers and hospital support. Participants in this group often referenced breastfeeding infants while in the NICU, and differentiated this from the provision of human milk. They also commented on the involvement of many team members to make decisions about infant feeding. For example, “Alice” stated:

“But usually we want to encourage that breastfeeding so if it's something where we're concerned about the first feed, then obviously we would definitely have speech, and usually we try to get lactation there too. Just to kind of have as many resources for that family as possible.”

This quotation provides an example of true interdisciplinary team assessment of a mother-infant dyad’s first feeding experience. In addition, hospital support of breastfeeding was also frequently reported in this group. “Betty” reported that her hospital provides in-services and events to promote breastfeeding. She stated:

“Many, many monthly educations.....We have a monthly education program that whatever's on someone's dashboard that gains importance, our educators create education either around the house or even specifically here in the NICU to support that. That goes out and people read the education and are supported by skills and take tests. It might be in a blurb in our weekly newspaper that all of our staff are responsible for. It might be in a staff meeting. It could come from a variety of venues to reach people in different ways and spark their attention.”

## **Tier 2**

The four most frequently used codes for hospitals in the Tier 2 group included performance improvement, breastfeeding, support and hospital support. Two out of the three respondents in this tier reported on performance improvement projects. This suggests an awareness of where the facility might be falling short of optimal support of breastfeeding, and a commitment to improving evidence-based care. “Brittany” stated:

“Being in the NICU, we very much encourage all of our moms to provide milk to their babies. I'm currently working with one of the attendings on a project to increase awareness to NICU staff.... of the importance of early initiation of pumping, along with hand expression and massage so that we get our moms pumping between one and four hours, or at least expressing milk so that we can....help with the production, start to weigh down those receptors.”

In addition, two out of three respondents in this tier commented on how nurses support mothers. “Christine” stated:

“Oh, there are a fair amount, especially with the younger mothers, that just kind of want to pump and feed breast milk rather than breastfeeding but we kind of try to support them through that and see if we can get the baby to the breast and help them be more comfortable since it's so much easier. And, I think it would improve their success rate long-term since it's not double duty.”

### **Tier 3**

In contrast to the most frequently assigned codes for Tier 1 and Tier 2 hospitals, most of which had positive connotations, all four of the most frequently assigned codes in Tier 3 have a negative connotation. The top codes in this group included nurse

discomfort, numbers, no team decision and lack of knowledge. All three respondents in this category reported that nurse discomfort factors into breastfeeding decision making.

“Audrey” states: “I think it’s just the lack of knowledge, the discomfort, not knowing what to teach a mother because they either have....A lot of people feel that if they haven’t themselves breastfed, they don’t feel like they know enough about it. So that they don’t feel like they know how to teach a mother to breastfeed.”

“Brenda” reports: “Yeah, there’s no doubt that there are nurses that are much more comfortable with the process than others.”

“Carol” says: “Well, I think it does take time for people to get comfortable putting that baby to breast.....All the staff know that there is resources available for them if they’re not comfortable, if they’re put in that situation that they’re not comfortable with.”

In addition to nurse discomfort, this group also frequently referenced lack of staff knowledge about breastfeeding. All three nurses referenced a lack of knowledge and

“Brenda” shared: “I guess I would say that there are a number of staff that will tell mothers that breastfeeding is more difficult. That it’s going to tire their baby out. That they will have a harder time getting them home, and I just simply don’t agree with that from personal experience and from working with mothers and their infants that has not been my experience. I don’t think it’s more difficult. I think that’s a misconception.”

All three nurses in this tier reported practices more suggestive of multi-disciplinary or unilateral decision making, when it comes to infant feeding and breastfeeding. When asked about who makes decisions about advancing a baby from tube feeds to oral feeds “Carol” says: “The nurse, the certified nurse. They [the physicians] look to the nurse and say ‘Well, what do you think?’ They don’t really decide. They leave

it mostly up to the nurse.....They look to the nurse as the expert on when to progress to a different level, uh, breastfeeding.”

In addition to these differences in the frequency and types of codes that emerged from the transcripts, there were also some differences in hospital support of breastfeeding. For example, three out of four of the hospitals in Tier 1 reported that they have full time, lactation consultants, dedicated solely to the NICU. However, only one Tier 2, and one Tier 3 hospital reported the same. Some hospitals in Tier 2 or Tier 3 reported that they have lactation consultants who may have responsibilities on other floors in the hospital, such as floating to other units like the pediatric intensive care unit (PICU). One respondent reported that they have a different lactation consultant from the labor and delivery floor come to the NICU four out of five days per week, and on the fifth day, they have to page and wait for the IBCLC to return the page, which can take some time. Many of the hospitals in Tier 2 and Tier 3 also reported use of lesser trained lactation professionals, such as lactation counselors. One respondent reported that there is not an IBCLC in the entire hospital, since they do not have a labor and delivery unit.

Another difference reported between hospitals in different tiers was related to the amount of training that new nurses receive before starting their assignment in the NICU. Two out of the four Tier 1 hospitals reported that nurses receive several hours of training in infant feeding and breastfeeding before starting their assignment, for which they are paid, as part of their onboarding, or orientation to their unit. This training is provided by an IBCLC, and at one hospital, resulted in a breastfeeding credential for all NICU nurses (certified breastfeeding counselor- CBC). Contrast this with the report from a Tier 3 hospital, which relies on nurse preceptors to provide on-the-job training to new NICU

nurses. This presents a problem for two reasons. First, nurses are incredibly busy, with multiple responsibilities per shift. If they are only caring for one or two babies, and they are working at a hospital with lower rates of breastfeeding, it may take them some time before they have the opportunity to learn about breastfeeding. Second, if they are paired with a nurse preceptor who has limited knowledge or experience with breastfeeding, the level of training for that new nurse may be substandard. This perpetuates the lack of knowledge that was frequently reported by responders from hospitals in Tier 3. Given that nurse discomfort was widely reported as a barrier to breastfeeding, it seems that hospitals in Tier 1 are addressing this issue by offering more training opportunities for nurses.

Many nurses in hospitals in Tiers 2 and 3 responded to the question “What can be done to improve breastfeeding rates in the NICU?” by emphasizing the need for increased lactation services. “Abigail” stated:

“Well, to be quite honest, I feel like there's not enough lactation support....because right now, we have one division for the whole children's center, and that includes being a resource to out-patient clinics.....there's many things for that lactation consultant to do. Not only consult but education....So, I feel like if we could do one thing a little better, it would be to have more resources allocated for lactation in the children's center.”

Likewise, “Brittany” shared:

“Full time lactation consultant. I'll say plural. More than one.”

It seems that nurses employed in Tier 1 hospitals are realizing the benefits of working in a hospital with IBCLCs dedicated to the NICU, and hospitals in Tiers 2 and 3 recognize

the importance of this support, and are calling out for increased use of IBCLCs in the NICU.

### **Discussion**

Results of this study demonstrate that NICUs in hospitals with neonatal-perinatal fellowship training programs employ different strategies to address key factors related to oral feeding and breastfeeding support. While some practices are more widely reported (i.e., use of kangaroo mother care, education of mothers on the benefits of breastfeeding), other breastfeeding support measures are utilized less often (e.g., first oral feeding occurring at breast, preventing the use of formula, use of rooming-in, etc.). These findings inform direct care providers in the NICU, hospital administrators, and policy makers by providing guidance to focus efforts for improving breastfeeding initiation with infants in the NICU. While some strategies are more costly or may require additional resources to implement (e.g., rooming-in), others could be accomplished with policy changes. For example, encouraging infants to experience the first oral feeding at breast requires no change to the physical structure of the NICU, and minimal monetary resources or nurse time to implement. Literature strongly supports the strategy of allowing infants to experience the first oral feed at the breast (Maastrup et al., 2014; McGrath, 2014; Pineda, 2011; Smith et al., 2003). The potential return on investment for improving this single practice may be higher than any other breastfeeding support or intervention discussed.

In addition to variations of practices employed, there were also discrepancies in codes and themes that emerged from the nurses' voices and reports. Most striking were the differences between hospitals in Tiers 1 and 2 from those in Tier 3. Nurses employed



in Tier 1 and 2 hospitals reported “positive” breastfeeding practices (e.g., hospital support, breastfeeding, performance improvement, etc.), while nurses employed in Tier 3 hospitals more frequently reported information resulting in “negative” codes (lack of knowledge, no team decision, nurse discomfort, and numbers). In addition, nurses in Tier 3 referenced practices already being implemented in the top hospitals – primarily, the use of IBCLCs who work solely in the NICU, affording them time, easier access to and familiarity with patients. In addition, hospitals in Tier 1 are providing more nurse training than hospitals in Tiers 2 and 3. This directly addresses the lack of knowledge and nurse discomfort that were frequently reported by Tier 3 responders.

This study has several limitations. First, only a subgroup of hospitals with NICUs in the U.S. was surveyed. While this facilitated a more homogenous population of infants (all NICUs were level III or IV, all admitted the youngest and most fragile of infants), this may skew results. Second, the lapse of time between when the quantitative and qualitative data were collected may present a historical confound. In the time that passed between when the questionnaire was completed, and when nurses were interviewed, hospitals may have changed practices, or implemented new improvement projects. Third, although the survey was piloted with professionals knowledgeable about NICU practices and policies, specific terms were not defined.

This investigation, when compared to previous studies yields several important results. This study suggests progress has been made implementing key factors related to oral feeding and breastfeeding support in the NICU (Dodrill et al., 2008; Siddell & Froman, 1994). In addition, important differences in trends and nurse reports between hospitals employing the most breastfeeding support practices, and those employing the

least were readily identified. The most striking difference being that nurses in the Tier 1 and Tier 2 hospitals reported more “positive” practices, while nurses in the Tier 3 hospitals reported more “negative” practices. This study highlights those breastfeeding practices advancing identified factors that will improve care for the sickest and most fragile infants.

### **Conclusion**

Breastfeeding is essential for optimal development of infants, especially those who require specialized care in the NICU. Despite empirical findings and clear recommendations in the literature, hospitals vary in the number and types of strategies used to support breastfeeding initiation and duration in the NICU. This study highlights differences in hospital practices, and explores trends contributing to the persistence of non-evidence based practices in the NICU. Replication of this research with expansion is merited to better understand how practices may vary in a larger population of NICUs, and to provide a venue for a diversity of NICU voices to be heard. Hearing from physicians, bedside nurses, lactation consultants, and allied health professionals (e.g., speech pathologists, occupational therapists, registered dietitians) through focus group interviews can shed light on how different professionals view breastfeeding, informing future initiatives in caring for these infants. Future longitudinal research that investigates the developmental trajectories of infants may illuminate those in-hospital supports that have the biggest impact on breastfeeding duration and those that facilitate optimal infant development, resulting in improved outcomes.

## **Appendix A: Quantitative Questions**

### **Identification of Investigators & Purpose of Study**

You are being asked to participate in a research study conducted by Cynthia O'Donoghue, Ph.D., CCC-SLP, and Elizabeth Nottingham, M.S., CCC-SLP from James Madison University. The purpose of this study is to gather information related to the practices related to oral feeding and breastfeeding support in the NICU.

### **Research Procedures**

This study consists of an online survey that will be administered to individual participants through *Qualtrics*. You will be asked to provide answers to a series of questions related to current feeding practices and decision making in your hospital's NICU. Should you decide to participate in this confidential research you may access the anonymous survey by following the web link located under the "Giving of Consent" section.

### **Time Required**

Participation in this study will require 10 minutes of your time.

### **Risks**

The investigator does not perceive more than minimal risks from your involvement in this study (that is, no risks beyond the risks associated with everyday life).

### **Benefits**

Potential benefits from participation in this study include learning about practices supporting breastfeeding in the NICU.

### **Confidentiality**

You are not required to provide the name of your institution. All IP addresses will be removed from the data analysis.

The results of this research will be presented at local, state, national, and/or international conferences. In addition, the results of this research will be written up and submitted for publication in peer-reviewed publications. The researchers retain the right to use and publish non-identifiable data. While individual responses are anonymous, aggregate data will be presented representing averages or generalizations about the responses as a whole. All data will be stored in a secure location accessible only to the researchers. Upon completion of the study, all data will be kept in a secure location to potentially be used in future research.

### **Participation & Withdrawal**

Your participation is entirely voluntary. You are free to choose not to participate. Should you choose to participate, you can withdraw at any time without consequences of any kind.

### **Questions about the Study**

If you have questions or concerns during the time of your participation in this study, or after its completion or you would like to receive a copy of the final aggregate results of this study, please contact:

Cynthia O'Donoghue, Ph.D., CCC-SLP

### **Questions about Your Rights as a Research Subject**

Dr. David Cockley

### **Giving of Consent**

I have read this consent form and I understand what is being requested of me as a participant in this study. I freely consent to participate. The investigator provided me with a copy of this form through email. I certify that I am at least 18 years of age. By clicking on the link below, and completing and submitting this anonymous online survey, I am consenting to participate in this research.

### Survey Questions

1. What is the level of neonatal care at your hospital?
2. How many NICU beds do you have?
  - a. 1-30
  - b. 31-60
  - c. 61-90
  - d. 91+
3. What is the best description of the location of your hospital?
  - a. Urban
  - b. Rural
  - c. Suburban
4. What is the name of your hospital (optional)?
5. Is your hospital certified as "baby friendly" (you adhere to the 10 steps, and have been designated by UNICEF and WHO as a baby friendly hospital)?
  - a. Yes
  - b. No
  - c. I don't know
6. Do you have The *Newborn Individualized Developmental Care and Assessment Program* (NIDCAP) certification?
  - a. Yes
  - b. No
  - c. I don't know
7. At what gestational age does your NICU accept babies?

- a. <26 weeks
  - b. 26-28 weeks
  - c. 29-30 weeks
  - d. 31-32 weeks
  - e. 33-34 weeks
  - f. Other (please list)
8. Are parents able to stay on-site at your hospital?
- a. Yes, we have a Ronald McDonald house where we offer accommodations to parents of our babies in the NICU.
  - b. Yes, we have private NICU rooms available where parents can “room in” with their babies
  - c. No, we do not have this capability at this time.
  - d. Yes, other accommodations are available (Please describe)
  - e. Other (please describe)
9. What criteria are used to determine when to discontinue tube feeding (choose all that apply)?
- a. Sufficient weight gain
  - b. Sufficient volume consumed during oral feeding
  - c. Perceived pressure from parents
  - d. Desire for discharge/transfer
  - e. Other (please describe)
10. Who is the team leader who decides when to begin oral feedings (check all that apply)?
- a. Neonatologist
  - b. Nurse
  - c. Pediatrician
  - d. Physical Therapist
  - e. Occupational Therapist
  - f. SLP
  - g. Lactation Consultant
  - h. Other (please specify)
11. Is there a formal process related to initiating oral feedings?
- a. Written policy
  - b. Formal protocol
  - c. Clinical pathway
  - d. There is no formal process
12. Are specific tests used to assess oral feeding readiness (Check all that apply)?
- a. We only use informal measures
  - b. Early Feeding Skills (EFS)
  - c. The Infant Breastfeeding Assessment Tool
  - d. LATCH

- e. The Mother Baby Assessment
  - f. Neonatal Oral Motor Assessment Scale (NOMAS)
  - g. Preterm Infant Breastfeeding Behavior Scale (PIBBS)
  - h. Systematic Assessment of the Infant at Breast
  - i. Safe Oral Feeding for Fragile Infants (SOFFI) method
  - j. Other (please list)
13. Which health professionals routinely perform assessment of oral readiness for feeding?
- a. Neonatologists
  - b. Nurses
  - c. Pediatricians
  - d. Lactation
  - e. SLP
  - f. OT
  - g. PT
  - h. Other (please list)
14. What criteria are used to determine when oral feedings are initiated (check all that apply)?
- a. Weight
    - i. 1000-1499 grams
    - ii. 1500-1999 grams
    - iii. 2000 or more
  - b. Gestational age
    - i. 26-28 weeks
    - ii. 29-30 weeks
    - iii. 31-32 weeks
    - iv. 33-34 weeks
    - v. 35-36 weeks
    - vi. Other (please list)
  - c. Behavioral cues
    - i. Infant state (waking/alert)
    - ii. Rooting
    - iii. Observed sucking behavior
    - iv. Other (please describe)
  - d. Non-nutritive sucking ability
  - e. Infant development and maturation
  - f. Other (please list)
15. What is the youngest gestational age at which *nutritive* oral stimulation is begun?
- a. 20-22 weeks
  - b. 22-23 weeks
  - c. 24-25 weeks

- d. 26-27 weeks
  - e. 28-29 weeks
  - f. 30-31 weeks
  - g. 32-33 weeks
  - h. 34 weeks or more
16. How often are oral feedings provided?
- a. On a schedule (please describe)
  - b. It varies, based on infant cues
  - c. A combination of schedule and cues (please describe)
  - d. Other (please list)
17. For mothers expressing the desire to breastfeed, which oral feeding method is routinely introduced first?
- a. Breast
  - b. Bottle
  - c. Cup
  - d. Syringe
  - e. Finger
  - f. Other (please list)
18. For mothers expressing the desire to breastfeed, if breast is not offered before the bottle, why not?
- a. Availability of mother
  - b. Infant characteristics
  - c. Current protocol
  - d. We require mastery of bottle feeding before introducing breastfeeding
  - e. Other (please describe)
19. For mothers expressing the desire to breastfeed, how many times are babies latched onto or exposed to the breast before discharge?
- a. 0-5
  - b. 6-10
  - c. 11-20
  - d. More than 20
  - e. Other (please describe)
20. For mothers expressing the desire to breastfeed, are specific interventions routinely used to establish breastfeeding competence (check all that apply)?
- a. Breast shields
  - b. Consultation with lactation
  - c. Consultation with SLP/OT/PT
  - d. Frequent exposure/latching onto breast
  - e. Use of supplemental nursing system
  - f. Limiting/preventing use of pacifiers
  - g. Rooming in (mother is able to stay with the infant in a private room)

- h. Preventing use of formula
  - i. Other (please describe)
21. Which is the best description of your use of fortifier to increase caloric density of human milk?
- a. We routinely use fortifier for babies receiving breastmilk
  - b. We sometimes use fortifier, for babies that consistently demonstrate difficulties with growth when receiving breastmilk alone
  - c. We do not use fortifier to increase caloric density of human milk
  - d. We use natural methods to increase caloric density (mother pumps foremilk, baby receives higher proportion of hindmilk)
  - e. Other (please describe)
22. If so, which kind?
- a. Bovine based fortifier
  - b. Human-milk based fortifier
  - c. Other (please describe)
23. Does your NICU routinely practice kangaroo care?
- a. Yes
  - b. No
  - c. I don't know
24. What therapy services are available in your NICU?
- a. Speech Therapy
  - b. Occupational Therapy
  - c. Physical Therapy
  - d. Lactation
  - e. Dietician
  - f. Other (please specify)
25. What services do these professionals provide (check all that apply)?
- a. Permanent staff member in NICU- part-time
  - b. Permanent staff member in NICU- full time
  - c. Visiting staff member in NICU
  - d. Offer services related to feeding assessment
  - e. Offer services related to feeding therapy
  - f. Involved in feeding management for special populations only (ex: cleft palate)
  - g. Offer services related to developmental assessment
  - h. Offer services related to developmental therapy
  - i. Offer individual patient services
  - j. Offer group services
  - k. Offer staff training/in-services/professional development
26. Does your NICU have formal criteria for when to refer for these services?



- a. Yes
  - b. No
  - c. I don't know
27. Does your NICU offer a specific follow-up clinic for babies?
- a. No, we do not offer a follow-up clinic at this time
  - b. Only for high-risk infants
  - c. Yes, we offer a follow-up clinic for any babies who have spent time in the NICU
  - d. I don't know
28. How long do you follow the development of children discharged from your NICU?
- a. 6 months
  - b. 12 months
  - c. 24 months
  - d. 36 months
  - e. More than 36 months
29. If so, which medical professionals are involved in that clinic?
- a. MD (developmental pediatrician, neurologist, etc.)
  - b. Nurse practitioner/Physician Assistant
  - c. SLP
  - d. OT
  - e. PT
  - f. Lactation
  - g. Special Educator
  - h. Other (please list)
30. Is there a set schedule for how often you see these children?
- a. Yes, we see these children at pre-determined intervals (ex: every 3 months)
  - b. No, it is up to the discretion of the medical providers as to when the children are scheduled
31. Who is responsible for monitoring the feeding development of babies discharged from your NICU?
- a. Their feeding development is monitored at our follow-up clinic
  - b. Outside sources (such as early intervention, or private practice therapists) monitor feeding development of these babies
  - c. The child's pediatrician is responsible for monitoring feeding development
  - d. I am not sure
  - e. Other
32. What is your role in the NICU?

- a. Head Nurse
- b. IBCLC
- c. Staff Nurse
- d. Other (please list)

33. How many years have you been employed in the NICU?

- a. 0-3
- b. 4-6
- c. 7-10
- d. 10+

34. What is your highest level of education?

## **Appendix B: Qualitative Questions**

I am interested in learning about your experiences at (name of hospital). I am going to ask you some questions related to both your training and education as well as your work experience. There is no right or wrong answer. You can stop the interview at any time without any type of penalty. This is entirely voluntary and you will not be paid for your time. Do you feel ready to begin?

### **Phase II Interview Questions**

1. Please state your name and your role in the NICU.
2. How many years have you been employed in that role?
3. How many years have you worked for your current employer?
  - a. Possible follow-up: years worked in other NICUs, how many other, different NICUs have you been employed in
4. How many beds does your NICU have, and describe the capacity at which your NICU normally operates?
5. Does your NICU provide free formula samples to mothers?
6. Does your hospital have a NICU breastfeeding promotion program?
7. Describe the level of knowledge and or/training related to human lactation that you have received, and explain how you gained that knowledge and/or training?
  - a. Possible follow up: during formal education (in nursing school)?  
CEUs related to job? Sought specific training?
8. Does your hospital offer a specific course for nurses to be educated about breastfeeding in the NICU?

- a. Possible follow up: is it required or optional? Are you paid for your time attending the course?
9. Describe the “breastfeeding culture” at your hospital.
- a. Possible follow-up: Baby friendly designation? Follow 10 steps for the BFHI?
  - b. Has this changed in any ways, since you have been employed there?
  - c. How is it the same/different to any other NICUs in which you have worked?
10. Describe the oral feeding practices at your hospital.
- a. Possible follow up: infant led, volume-driven, etc.
  - b. Who, ultimately, decides the progression of oral feeding?
11. Explain your role in infant-feeding decision making, and the role of other team members.
12. In your opinion, how does oral feeding rank in importance, compared to other medical complications that many of your babies have? How does this compare to the attitudes of other staff members?
13. Describe your feelings surrounding the use of donor human milk.
- a. Possible follow-up: informal milk sharing, vs milk-bank
14. Describe your feelings surrounding the use of human milk fortifiers.
- a. Possible follow-up: bovine based vs. human milk based
15. What is your opinion regarding the importance of direct breastfeeding for babies in the NICU? Does this reflect the opinions of other staff members?
16. What could be done to improve direct breastfeeding rates in the NICU?

17. Is your hospital a birthing hospital?

18. Level of education

## Appendix C: Code Book

1. Any codes with < 3 mentions have been deleted
2. Indicate, next to the code, a (+) for a perceived strength/support and (–) for a perceived weakness/barrier

	<u>Category</u>	<u>Code</u>	<u>Abbreviation</u>	<u>Brief Description</u>
+	Culture/practice	1. Breast feeding presence	BF Presence	Strong breastfeeding presence,
+	Hospital Resources	2. IBCLC	IBCLC	Use of international board certified lactation counselors
-	Hospital Resources (lack)	3. Breastfeeding professionals, are there lesser trained lactation professionals who are able to help support other nurses and moms?	CLC or CBC	Rely on breastfeeding professionals with less training/certification
+	Hospital Resources	4. Breastfeeding committee (SWBC)	BFC or SWBC	A group of professionals who meet to discuss issues/topics/policies related to breastfeeding
+	Resources	5. Projects in the NICU	Pro	Time/resources dedicated to improving breastfeeding or access to breast milk
+	Breastfeeding Experience	6. Pumping (pump dependency, teaching about pumping, expressing milk, etc.)	PUMP/express	Mothers who are not able to directly breastfeed their infant, and rely on pumping alone to maintain milk supply
+	Culture/practice	7. Skin to skin/Kangaroo Mother Care	STS	Putting baby nude or in a diaper, on mom or dad's chest, to facilitate control of body temps, and bonding
+	Breastfeeding Experience	8. Breastfeed at discharge	BF @ d/c	A baby is eating directly from the breast when discharged from the hospital
+	Culture/practice	9. Improvements- open to change, momentum,	PE/PI	Working toward more evidence-based practice, improvement in practices

		keystone 10		
+	Culture/practice	10. Nursing support	Supp	Nurses supporting moms- can be related to pumping, STS, or breastfeeding
+	Prof edu/training	11. Professional interest	Int	Nurse is interested in learning more about breastfeeding, or learning more about helping moms breastfeed. “you can request to follow a lactation consultant around in the hospital”
+	Breastfeeding Experience	12. Personal Experience	Per Exp	Nurse has experience breastfeeding her own children
+	Prof edu/training	13. Professional Experience (or lack of)	Prof Exp	Nurse has work experience helping moms breastfeed
+	Prof edu/training;	14. Employer paid for certification	Employer Pay	Hospital offered to pay for course, or to pay for certification
+	Professional edu/training	15. Volunteer for advanced knowledge/training (also includes personal time commitment)	Vol (pers time, CEU)	“I volunteered to take it” (a course)
+	Hospital Resources	16. IBCLC in NICU	IBCLC in NICU	Trained IBCLC who works only in the NICU, does not have responsibilities for other floors in the hospital
-	Hospital Resources (lack)	17. Limited access to IBCLC	Lim acc	They (IBCLC) “intermittently pop down here”
-	Hospital Resources (lack)	18. Moms lack support	Lack sup	Mothers are not provided with the resources they need to successfully meet their goals (nursing support, family support, lactation support, etc.), IBCLC is not available
+	Prof edu/training	19. NICU nurse training	Train	IBCLC talks to new NICU nurses about lactation
+	Breastfeeding Experience	20. Promote Breastfeeding	Pro	Talk to moms (prenatally or after birth) about breastfeeding

+	Breastfeeding Experience	21. Breastfeeding	BF	Directly feeding at breast, different from MOM or DM in a bottle
+	Culture/practice	22. Hospital support of BF	Hosp supp	The general status of breastfeeding throughout the hospital, not just in the NICU. Could mean BFHI status.
+	Culture/practice	23. Non-nutritive sucking	NNS	The provision of sucking opportunities for infants who cannot eat by mouth. This may include pacifier, gloved finger, or emptied breast
+	Prof edu/training	24. Staff knowledge	Know	Staff and employee knowledge about breastfeeding
-	Resources (lack)/culture	25. Staff (or nurse) lack of knowledge	Lack of Know	Statements made that indicate a clear lack of knowledge about breastfeeding or infant feeding readiness, or nurse report of other staff members lacking knowledge related to breastfeeding
-	Hospital Resources (lack)	26. Nurse's comfort level	Nurse Discomfort	Describes a nurse's level of skill, proficiency and self-confidence (or lack of) in performing job duties, such as handling a baby on a ventilator, or putting a baby to breast (helping a baby breastfeed)
+	Breastfeeding Experience	27. Readiness (Infant cues, infant skills)	Ready	Infant behaviors to indicate readiness to feed, such as rooting, sucking on thumb, etc.
-	Culture/practice	28. Number oriented, feed sched, feed vol, WFW	Num	Being concerned with objective measures of an infant's feeding- including weight gained, and volume taken, "We create that type of mom that's so numbers oriented, that they're afraid not that if the baby's just getting milk from them, it doesn't have enough calories in it, and the baby's not going to grow"
-	Culture/practice	29. Bottle first	Bott first	Trying bottle feeding before breastfeeding



+	Culture/practice	30. Decision making- team (Use of PT, OT, SLP, RD, etc. to help make decisions about feeding modifications, allied health)	Team dec/ AH	Multiple players are responsible for making decisions related to infant feeding, sometimes including the parents
-	Culture/practice	31. Decision making- no team, hierarchy	No team dec,	One person is responsible for making decisions related to infant feeding
+	Culture/practice	32. Discharge dependent on oral feeds	d/c PO feeds	“Babies don’t go home unless they’re all orally feeding, either at the breast of a bottle”
+	Breastfeeding Experience	33. Honor mother’s wishes to breastfeed (or not)	Mother Wishes	Parents involved in decision making and infant care, and their preferences are upheld
+	Breastfeeding Experience	34. Balance (or lack of)	Bal	Trying to give importance to both breastfeeding and growth
+	Hospital Resources	35. Employer sponsored edu	Emp Spons Edu (could be CEU)	Employer offers education or certification maintenance activities, such as in-services, workshops, or trainings
-	Hospital Resources (lack)	36. Employee expense	Employee Exp (could be CEU)	Nurse pays for additional training, certification or credentials, related to lactation
+	Breastfeeding Experience	37. Oral care	Cares	Using colostrum or breastmilk during oral care
+	Breastfeeding Experience	38. Educate mothers/daily breastfeeding class	Edu Mom (BF class, BF course)	Explain to mothers the benefits of breastfeeding, of using donor milk, etc.
-	Prof edu/training	39. Lack of knowledge	Lack of know	Hospital staff tell mothers things that are not based in evidence, such as “Breastfeeding is more difficult”
-	Hospital Resources (lack)	40. Multiple responsibilities	Mult-resp	Nurses and IBCLC have many responsibilities, not enough time, overworked

+	Culture/practice	41. Consensus	Con	Shared views among staff of breastfeeding importance
-	Culture/practice	42. Variability	Var	Differing opinions among staff of breastfeeding importance
+	Breastfeeding Experience	43. Infant Driven	Inf	Cue-based feeds, physiologic stability, opposite of “number” oriented
+	Culture/practice	44. Evidence Based Practice	EBP	Citing established guidelines or recommendations-VON, AAP, WHO, peer-reviewed articles, etc.
+	Professional edu/training	45. Healthy gut function	Gut	Decreased chances of contracting NEC, improved gut functioning

## **Appendix D: Researcher Reflexivity**

I am a 38-year old Caucasian female currently living and working in Baltimore, Maryland. I am a Ph.D. candidate in Communication Sciences and Disorders at James Madison University located in Harrisonburg, Virginia. I am a licensed Speech-Language Pathologist in the state of Maryland. I have additional training and experience as a birth doula- having participated in the training provided by the Doulas of North America (DONA) organization. I am also a certified lactation counselor.

My interest in breastfeeding in the NICU, and accessibility to evidence-based practices for infants began while working as an Early Intervention therapist in upstate New York. While working in this setting, I heard stories from families whose feeding plans they created during pregnancy were altered because of the premature birth, and subsequent hospitalization of their newborn. Having read accounts of successful breastfeeding in the NICU, I knew that it was possible. I have had a close family member lose a baby in the NICU- the infant died before going home. This topic therefore, is personally as well as professionally relevant for me. Babies die in the NICU, and if changing practices and policies can save even one life, then I believe the effort is worth it.

In addition to the personal and professional experience I have with babies in the NICU, I am also a mother, and have breast-fed both of my children. With additional training and experience working as a doula, and breastfeeding peer counselor for the WIC program, and the research required to complete a thorough literature review for this project, my perspective is biased toward the normalcy of breastfeeding. I view breastfeeding as the biological norm. I believe that the provision of human milk to all

infants is essential to achieve normal development. I believe that a discussion about the different outcomes between babies who receive formula, and those who breastfeed should be framed around the *risks* of formula feeding, not around the *benefits* of breastfeeding. Finally, I believe that for all but a very small percentage of women, breastfeeding is possible, when they are provided with proper information, support, and guidance.

## **Appendix E: Extended Literature Review**

Searches of online databases (i.e., PubMed, google scholar, Scopus) yielded numerous articles addressing evaluation of factors affecting breastfeeding in the preterm population. There were three articles chosen for inclusion in this review that reported original research related to direct breastfeeding in the NICU. The final article was an expert opinion piece written by a leading researcher and academic in the field of neonatal nursing. Articles were excluded that did not explicitly address outcome measures of direct breastfeeding on breastfeeding duration. While it is important to understand various practice patterns in the NICU environment, this review sought to collect evidence on the relationship between direct breastfeeding while in the NICU and breastfeeding duration (post-discharge) in preterm infants.

While other factors co-occur to create increased likeliness of breastfeeding at discharge from the NICU and beyond, many of these factors may be more difficult to implement in the current NICU environment in this country (such as mother and baby sharing a room while in the hospital, changing breastfeeding culture, and access to paid parental leave). Allowing babies frequent exposure directly at breast, and ensuring that the first oral feeding is at the breast is an area that may be more amenable to change. Therefore, understanding the basis for this recommendation is essential.

While the articles chosen used a variety of methods including retrospective chart review, years of clinical, academic and research expertise, mother reported historical data and a prospective survey via interviews of caregivers, the evidence was overwhelmingly consistent. Mothers who feed their infants directly at the breast before the infant is discharged home demonstrated increased duration of breastfeeding. The articles reported this in varied ways. Some reported simply on the rates of breastfeeding at the time of

discharge from the hospital, while others reported data on outcomes after the babies were discharged home.

The most striking article, used retrospective chart review of 136 infants born in a 75-bed level II and III NICU (Pineda, 2011). Of the 136 charts identified, 84 were analyzed, and 66 of those included infants who were provided with mothers' own milk while in the hospital. The charts included those of babies who were born at very low birth weights (weighing less than 1500 grams) at a hospital whose routine charting practices included documentation of the type of feeding each time the infant feeds orally. This level of documentation provided 100% reliability between researchers regarding the accuracy of facts surrounding the details of each infant's feeds. Data regarding the age at which the infant was put directly to breast, the mode of the first oral feeding (whether at breast or not) and the number of times an infant was put to breast while in the NICU were collected and analyzed.

Results indicated that of those babies who were ever breastfed in the NICU, 62% were still receiving breast milk at discharge, while only 3% of babies who were never breastfed in the hospital were still receiving breast milk at discharge. When analyzed using logistic and linear regression, this difference was statistically significant ( $p < 0.0001$ ). Even more remarkable are the data linking the first oral feeding occurring directly at the breast with the number of direct breastfeeds while in the hospital. Babies who did not experience the first oral feed at the breast had a range of breastfeed attempts from 0-17 (median=0). However, babies who experienced the first oral feeding at the breast, ranged from 1-57 direct breastfeeding occurrences (median =18). This finding was also statistically significant ( $p < 0.0001$ ). This suggests the importance of ensuring

that the first oral feeding occurs at the breast, which directly impacts the number of feeds at the breast while in the NICU, which then influences whether a baby is still receiving breast milk at discharge.

This notion of the importance of the first oral feeding occurring at the breast is also emphasized by McGrath (2014) who stated that, "...as soon as they are developmentally able to begin oral feedings, the preferred method for *all* oral feedings is direct breastfeeding" (p. 6). Although this expert opinion piece is not a rigorous, scientifically based study, Dr. McGrath is well published and highly respected in the field of lactation and neonatal medicine. She reported on her clinical experiences working directly with families and provided anecdotal evidence that given the choice for the baby's first feed to occur when it is signaling it is hungry (i.e., cue-based feeding approach) with a bottle, or to wait until the mother is available to directly breastfeed her baby, families tend to choose the latter. This suggests that family preference is to have the first oral feeding occur at breast, which is in line with recent recommendations set forth by the National Association for Neonatal Nurses (Spatz & Edwards, 2015). McGrath (2014) stressed that "[the] importance of establishing routine care giving practices in the NICU that are truly supportive of exclusive breastfeeding mothers is imperative" (p. 7) and reported that for breastfeeding to be successful after discharge, it needs to first be successful in the NICU.

Successful breastfeeding while in the NICU was also studied at five different hospitals across New York, New Jersey and Massachusetts via a retrospective analysis using mother report of feeding patterns while her baby was in the NICU and after return to home (Smith, Durkin, Hinton, Bellinger, & Kuhn, 2003). Researchers analyzed data

provided by 361 mothers related to recall of their infant feeding directly at the breast while in the NICU, and the time at which they ceased providing mothers' own milk to their infant. They reported that only 43% of women who initiated pumping, directly fed their baby at the breast ( $n = 97$ ). For these children who participated in direct breastfeeding, 70 (72%) were still receiving breast milk at four months. However, for infants who received expressed breast milk only ( $n = 121$ ), 12 were still receiving breast milk at 4 months (10%). Further, of the 47 infants receiving breast milk at the age of six months (as recommended by the WHO and AAP), 42 of them (89%) received direct breastfeeding while in the hospital. The majority of infants who were not directly breastfed in the NICU had ceased breastfeeding by one to three months of age, with a large proportion only reaching one to four weeks (Smith et al., 2003).

Although these results are important, there were several limitations to this study. First, there may be geographic and/or demographic differences causing confounding factors not considered in the early cessation of breastfeeding, since the data included hospitals from three different states. Additionally, in the tables presented in the article, data for only four hospitals were included (labeled as hospital center A, B, C and D), although they stated that they analyzed data from five hospitals. Researchers also reported that data related to initiation of direct breastfeeding was quite variable between hospitals, ranging from 6.5% of the sample at one hospital to 50.4% at another hospital (Smith et al., 2003). The range of practices at different hospitals could have been highlighted in more depth, and more rigorous statistical analysis (beyond descriptive statistics) would have provided information related to the significance (both practical and



statistical) of their findings. However, this finding further supports the documented variation in practices between different hospitals.

While differences between hospitals in the US are apparent, there are also significant differences in practices between countries, with Europe, and particularly Scandinavia, leading the way with family friendly maternity practices, and exemplary breastfeeding practices. This breastfeeding culture also pervades the NICU environment as well. Although several factors important for breastfeeding success in the NICU are implemented consistently, other factors will take time to become common-place in our society. Factors such as paid maternity/paternity leave, universal access to health care, availability for mothers to stay with their infants at the hospital around the clock, and acceptance of breastfeeding as the cultural norm, are not easily changed without significant political and policy changes. However, one practice that may be easily changed is the ability of the infant to feed directly at the breast for the first oral feeding, and to be put to breast often while in the NICU.

One study, which details practices for preterm neonates in Denmark, emphasizes the importance of breastfeeding while in the NICU. Researchers designed a prospective survey using questionnaires and interviews of mothers whose infants were in 18 of Denmark's 19 NICUs from September 2009 to December 2011 (Maastrup et al., 2014). Three questionnaires were administered: one week after the infant was born, one at the time of discharge from the NICU, and the final questionnaire was administered via structured phone interviews to mothers when their infants reached ages 1, 4, 6, and 12 months, corrected age, or until breastfeeding was discontinued. Mothers who did not

initiate breast milk expression and those who did not plan to breastfeed were excluded from the data analysis.

In the cohort included in this study, a near-perfect success rate with breastfeeding initiation was reported (99% of mothers breastfed their infants). It is important to note that this success rate is for mothers who planned to breastfeed, or initiated breast milk expression. The success rate of breastfeeding initiation should exclude mothers with no intention or ability to breastfeed, which was a strength of this study. Researchers also reported that 79% of infants experienced their first oral feeding directly at the breast, and a majority (66%) of infants who exclusively breastfed for their first *complete* oral feeding, were supplemented with a tube feeding rather than by bottle (Maastrup et al., 2014). They also found that of the infants exclusively breastfed at discharge, 95% had their first complete oral feeding exclusively at the breast. This finding was statistically significant ( $p < 0.0001$ ).

At the time of discharge, 85% of infants were exclusively or partially breastfeeding, and of the infants who were exclusively breastfed at discharge, 45% of them were still breastfeeding at corrected age of six months, as compared to only 23% of infants who were partially breastfeeding at discharge. This result was also statistically significant ( $p < 0.0001$ ). Researchers emphasized that “[it] is important that preterm infants establish exclusive breastfeeding at and from the breast at discharge, as this affects breastfeeding duration” (Maastrup et al., 2014, p. 9).

There are strengths to this study, including (as mentioned above) the exclusion of mothers who do not intend to breastfeed and rigorous statistical analysis. Additionally, the prospective design improves the accuracy of mothers’ reports, by eliminating the

need to rely on memory, and the large cohort of families included across the country of Denmark adds to its internal and external validity. Along with exemplifying its national status as a pillar of breastfeeding success, this article demonstrates how a perfect combination of factors can come together to support mothers and babies in an optimal start to a long breastfeeding journey.

While these studies employ different methods, populations and analyses, one theme is strong throughout each: the importance of establishing direct breastfeeding in the NICU. There are many factors that contribute to the success of breastfeeding which are rarely incorporated in the regular practices of NICUs throughout this country. However, one easily modifiable practice is to allow babies to nurse directly at the breast the first time they feed orally, and to encourage, support and teach mothers to feed their babies directly at the breast while in the NICU. This practice helps to facilitate direct breastfeeding, leading to improved duration of breastfeeding, and ultimately, the health of some of the tiniest, and most fragile members of our society.

It is important to understand the current state of breastfeeding support, as well as to gain insight into the oral feeding practices commonly occurring in different Neonatal Intensive Care Units. By gaining insight surrounding current practices, researchers can then begin to explore barriers to change. The review of the literature and enhanced understanding of best practice guidelines has yielded important research questions. The questions posed are best answered using a mixed methods approach, to gain deeper understanding of the phenomena being studied, and to study the emergence of hypotheses using the principles of grounded theory inquiry.

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